

1 **CLAIMS**

2 1. A method comprising:
3 receiving a plurality of temporally non-contiguous portions of a streaming
4 media file, at least a first and a second of the non-contiguous portions being
5 encoded at different bit rates; and
6 storing the plurality of temporally non-contiguous portions in a single cache
7 file.

8
9 2. A method as defined in claim 1, wherein the first and second non-
10 contiguous portions comprise video data.

11
12 3. A method as defined in claim 1, wherein the first and second non-
13 contiguous portions comprise video data and wherein a third non-contiguous
14 portion comprises audio data.

15
16 4. A method as defined in claim 1, wherein the cache file is stored in
17 non-volatile memory.
18
19
20
21
22
23
24
25

1 5. A method as defined in claim 1, wherein the act of storing
2 comprises:

3 creating a plurality of media cache streams, each media cache stream
4 being associated with a unique bit rate;

5 storing the first non-contiguous portion in a media cache stream
6 associated with the bit rate of the first non-contiguous portion;

7 storing the second non-contiguous portion in a media cache stream
8 associated with the bit rate of the second non-contiguous portion; and

9 storing the media cache streams in the cache file.

10
11 6. A method as defined in claim 1, wherein the act of storing
12 comprises:

13 creating a first media cache stream associated with the bit rate of the
14 first non-contiguous portion;

15 storing the first non-contiguous portion in a media cache segment of
16 the first media segment stream;

17 creating a second media cache stream associated with the bit rate of
18 the second non-contiguous portion;

19 storing the second non-contiguous portion in a media cache segment
20 of the second media cache stream;

21 creating a byte cache index segment and a byte cache data segment
22 for each media cache segment; and

23 storing the byte cache index segments and the byte cache data
24 segments in the cache file.

1 7. A method comprising:
2 creating a plurality of media cache streams, each media cache stream being
3 associated with a unique bit rate;
4 receiving a plurality of portions of a streaming media file, each portion
5 being associated with a unique temporal section of the streaming media file;
6 storing each portion in a media cache segment of a media cache stream
7 associated with a bit rate at which the portion was encoded, at least two of the
8 portions being stored in media cache segments in different media cache streams;
9 storing each of the media cache streams in a single cache file.
10

11 8. A method as defined in claim 7, wherein the act of storing
12 comprises:
13 creating a byte cache index segment and a byte cache data segment for each
14 media cache segment; and
15 storing the byte cache index segments and the byte cache data segments in
16 the cache file.
17

18 9. A method as defined in claim 7, wherein the act of storing
19 comprises:
20 creating a byte cache index segment and a byte cache data segment for each
21 segment; and
22 serializing the byte cache index segments and the byte cache data segments
23 in the cache file.
24
25

1 10. A method as defined in claim 7, wherein the cache file is stored in a
2 non-volatile manner.
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

1
2 11. A system comprising:
3 a data storage module;
4 a caching module operable to receive and store a plurality of temporally
5 non-contiguous portions of a streaming media file in a cache file in the data
6 storage module, two or more of the plurality of temporally non-contiguous
7 portions being encoded at different bit rates.
8

9 12. A system as defined in claim 11, wherein the data storage module
10 comprises a non-volatile data storage device.
11

12 13. A system as defined in claim 11, further comprising:
13 a processor; and
14 wherein the caching module comprises processor executable code.
15

16 14. A system as defined in claim 11, wherein the caching module
17 comprises:

18 a media cache module operable:
19 to store each of the plurality of temporally non-contiguous portions
20 as a media cache segment in one of a plurality of media cache streams; and
21 parse each media cache segment into a byte cache index segment
22 and a byte cache data segment.
23
24
25

1 15. A system as defined in claim 11, wherein the caching module
2 comprises:

3 a media cache module operable to:

4 store each of the plurality of temporally non-contiguous
5 portions as a media cache segment in one of a plurality of media
6 cache streams, each media cache stream being associated with a
7 different bit rate; and

8 parse each media cache segment into a byte cache index
9 segment and a byte cache data segment; and

10 a byte cache module operable to store the byte cache index segments and
11 the byte cache data segments in the cache file.

12
13 16. A system as defined in claim 11, wherein the caching module
14 comprises:

15 a media cache module operable to:

16 create a plurality of media cache streams, each media cache stream
17 being associated with a unique bit rate; and

18 store each temporally non-contiguous portion as a media cache
19 segment in a media cache stream associated with a bite rate at which the
20 temporally non-contiguous portion was encoded; and

21 parse each media cache segment into a byte cache index segment
22 and a byte cache data segment; and

23 a byte cache module operable to:

24 store the byte cache index segments and the byte cache data
25 segments in the cache file.

1
2 17. A system as defined in claim 11, wherein the two or more of the
3 plurality of temporally non-contiguous portions include a first video portion
4 encoded at a first bit rate, a second video portion encoded at a second bit rate, and
5 an audio portion, and wherein the first video portion, the second video portion, and
6 the audio portion are stored in different media cache streams.

7
8 18. A system as defined in claim 11, wherein:

9 the streaming media file includes different data types; and

10 the caching module is operable to:

11 create a plurality of media cache streams, each media cache
12 stream being associated with a streamed media data type and a streamed
13 media encoded bit rate;

14 store each temporally non-contiguous portion of received
15 streamed media data in a media cache stream associated with the streamed
16 media data type and a streamed media encoded bit rate of the temporally
17 non-contiguous portion; and

18 store the media cache streams in the cache file.
19
20
21
22
23
24
25

1 19. A system as defined in claim 11, wherein:

2 the streaming media file includes different data types; and

3 the caching module is operable to:

4 create a plurality of media cache streams, each media cache
5 stream being associated with a streamed media data type and a streamed
6 media encoded bit rate; and

7 store each temporally non-contiguous portion of received
8 streamed media data as a media cache segment in a media cache stream
9 associated with the streamed media data type and a streamed media
10 encoded bit rate of the temporally non-contiguous portion;

11 parse each media cache segment into a byte cache index
12 segment and a byte cache data segment; and

13 store the byte cache index segments and the byte cache data
14 segments in the cache file.

15
16 20. A system as defined in claim 11, wherein the caching module is
17 operable to:

18 store each of the plurality of temporally non-contiguous portions as a
19 media cache segment in one of a plurality of media cache streams;

20 create a segment/stream map specifying the media cache segment
21 and stream in which each temporally non-contiguous portion is stored; and

22 parse each media cache segment into a byte cache index segment
23 and a byte cache data segment.

1 21. A computer-readable medium having computer-executable
2 instructions for performing acts comprising:

3 storing at a client a plurality of temporally non-contiguous portions of a
4 streaming media file received from a streaming media source in a cache file, each
5 of the plurality of temporally non-contiguous portions being encoded at a different
6 bit rate.

7
8 22. A computer-readable medium as defined in claim 21, wherein the act
9 of storing comprises:

10 receiving a first video portion of the streaming media file encoded at a first
11 bit rate;

12 storing the first video portion in a media cache video stream associated with
13 the first bit rate;

14 receiving a second video portion of the streaming media file encoded at a
15 second bit rate;

16 storing the second video portion in a media cache video stream associated
17 with the second bit rate;

18 receiving a first audio portion of the streaming media file;

19 storing the first audio portion in a media cache audio stream; and

20 storing the audio and video media cache streams in a cache file.
21
22
23
24
25

1 23. A computer-readable medium as defined in claim 21, wherein the act
2 of storing comprises:

3 receiving a first video portion of the streaming media file encoded at a first
4 bit rate;

5 storing the first video portion in a media cache video stream associated with
6 the first bit rate;

7 receiving a second video portion of the streaming media file encoded at a
8 second bit rate;

9 storing the second video portion in a media cache video stream associated
10 with the second bit rate;

11 receiving a third video portion of the streaming media file encoded at a first
12 bit rate, the a third video portion being temporally non-contiguous from the first
13 video portion;

14 storing the third video portion in the media cache video stream associated
15 with the first bit rate;

16 receiving a first audio portion of the streaming media file; and

17 storing the first audio portion in a media cache audio stream; and

18 storing the audio and video media cache streams in a cache file.

19
20 24. A computer-readable medium as defined in claim 21, wherein the act
21 of storing comprises:

22 storing each of the temporally non-contiguous portions in a unique media
23 cache segment;

24 forming at least two byte cache segments from each media cache segment;

25 and

1 storing the byte cache segments in the cache file.

2
3 25. A computer-readable medium as defined in claim 21, wherein the act
4 of storing comprises:

5 storing each of the temporally non-contiguous portions in at least two byte
6 cache segments; and

7 storing the byte cache segments in the cache file.

1 26. A computer-readable medium having stored thereon a data structure,
2 comprising:

3 a plurality of data pages including data representing a plurality of
4 temporally non-contiguous portions of a streaming media file received from a
5 streaming media source, at least two of the temporally non-contiguous portions
6 being encoded at different bit rates.

7
8 27. A computer-readable medium having stored thereon a data structure,
9 comprising:

10 a plurality of data pages storing one or more byte cache segments, each
11 byte cache segment being derived from a temporally non-contiguous portion of a
12 streaming media file, at least two of the temporally non-contiguous portions being
13 encoded at different bit rates; and

14 a header page including information that describes one or more
15 characteristics of the data pages.

16
17 28. A computer-readable medium as defined in claim 27, wherein the
18 header page includes a plurality of cache file control records, each cache file
19 control record including information describing the location of a single byte cache
20 segment the data pages.

1 29. A computer-readable medium as defined in claim 27, wherein the
2 header page includes a plurality of cache file control records, each cache file
3 control record including information describing a location of a single byte cache
4 segment within the data pages and information indicating a number of pages
5 including the single byte cache record.

6
7 30. A computer-readable medium as defined in claim 27, wherein the
8 header page includes a plurality of cache file control records, each cache file
9 control record including information describing a beginning and an ending point
10 of a single byte cache segment within the data pages.

11
12 31. A computer-readable medium as defined in claim 27, wherein:
13 the header page includes a plurality of cache file control records; and
14 at least one cache file control record includes an array including the
15 location of each page within the cache file.

16
17 32. A computer-readable medium as defined in claim 27, wherein:
18 the header page includes a plurality of cache file control records; and
19 at least one cache file control record includes information indicating a page
20 containing a beginning of a single byte cache segment and an index specifying a
21 beginning of the single byte cache segment within the page.

1 33. A computer-readable medium as defined in claim 27, wherein:
2 the header page includes a plurality of cache file control records; and
3 at least one cache file control record includes information defining a
4 beginning and ending locations of a single byte cache segment in the data pages.
5

6 34. A computer-readable medium as defined in claim 27, wherein the
7 header page includes a plurality of cache file control records, each cache file
8 control record being associated with a single byte cache segment, each cache file
9 control record identifying a predetermined number of pages including at least a
10 portion of the byte cache segment associated with the cache file control record,
11 each cache file control record including a pointer to a page including information
12 identifying a predetermined number of pages other than the predetermined number
13 of pages including at least a portion of the byte cache segment associated with the
14 cache file.
15

16 35. A computer-readable medium as defined in claim 27, wherein the
17 header page includes:

18 a predetermined number of cache file control records, each cache file
19 control record including information describing the location of a single byte cache
20 segment in the data pages; and

21 a pointer to a cache file control record extension page including cache file
22 control records other than the predetermined number of cache file control records.
23
24
25

1 36. A system comprising:

2 means for receiving a plurality of temporally non-contiguous portions of a
3 streaming media file, at least two of the plurality of temporally non-contiguous
4 portions being encoded at a different bit rate; and

5 means for associating and storing the plurality of temporally non-
6 contiguous portions in a data structure.
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25